AnyLogic Simulation

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Introduction to AnyLogic

AnyLogic is a powerful simulation software used for modeling industrial and mechanical systems. It supports **discrete event**, **agent-based**, and **system dynamics** simulations, making it an excellent tool for **manufacturing, logistics, and automation** studies.

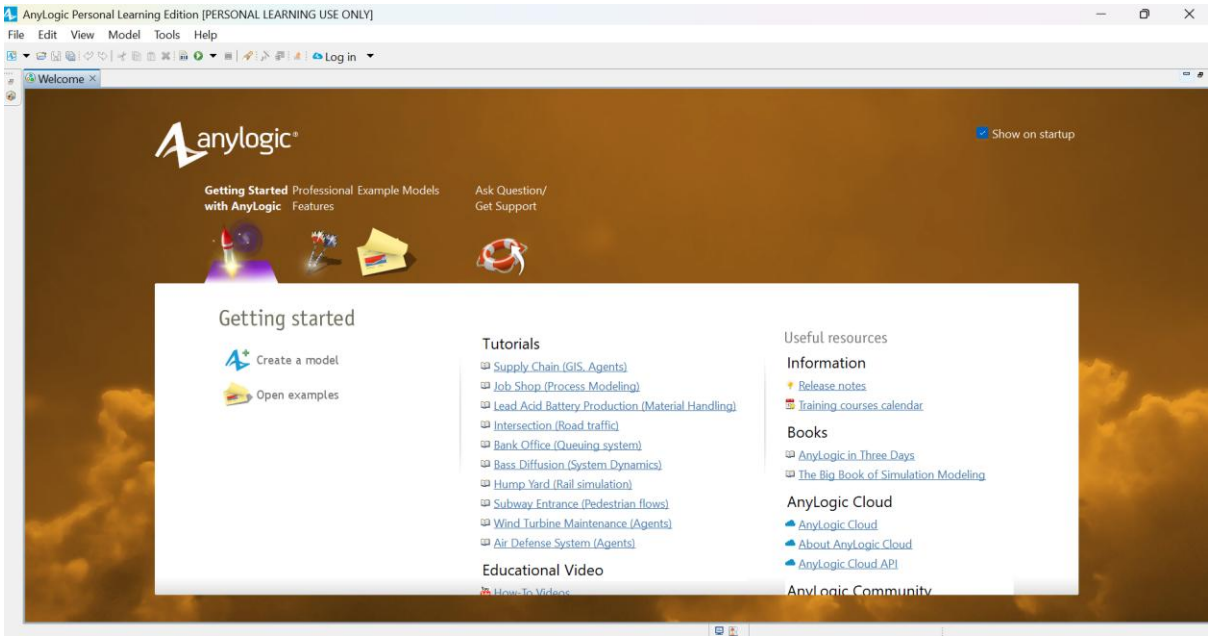
Applications in Mechanical Engineering

- **Manufacturing Process Simulation**: Conveyor belt systems, robotic arms, and production lines.
- **Logistics and Supply Chain**: Warehouse automation and material handling.
- **Optimization**: Improving factory layouts and reducing bottlenecks.
- **Human-Machine Interaction**: Simulating worker movements in industrial setups.

1. Setting Up an AnyLogic Project

Steps to Create a Conveyor Simulation:

1. **Open AnyLogic** and create a new **Discrete Event Model**.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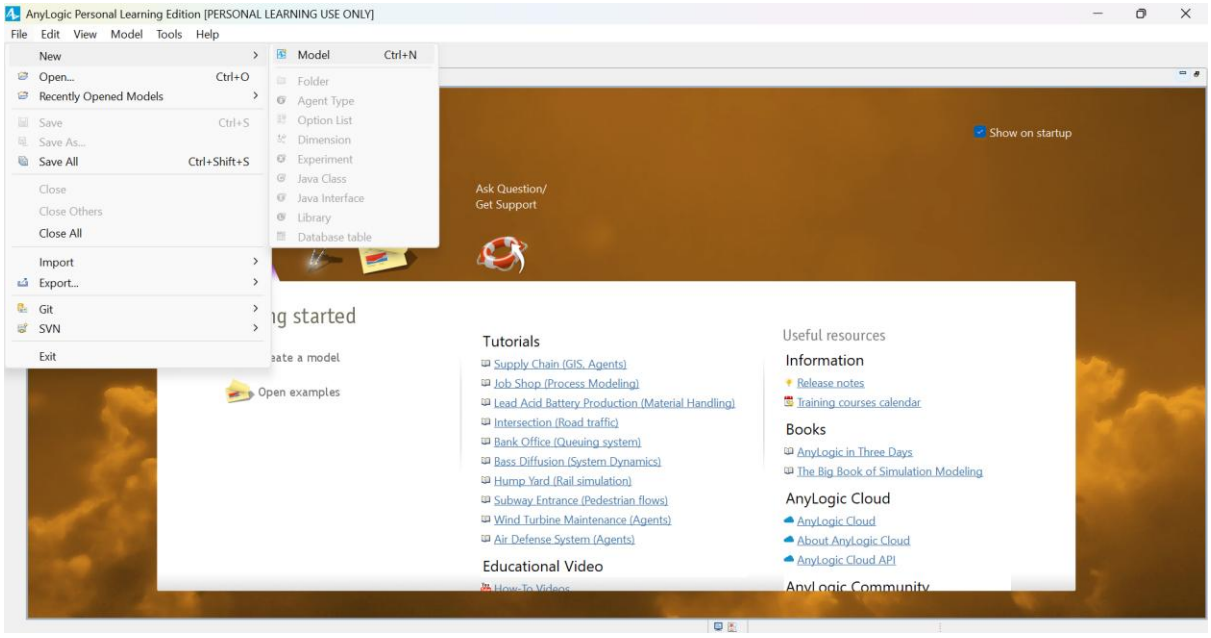
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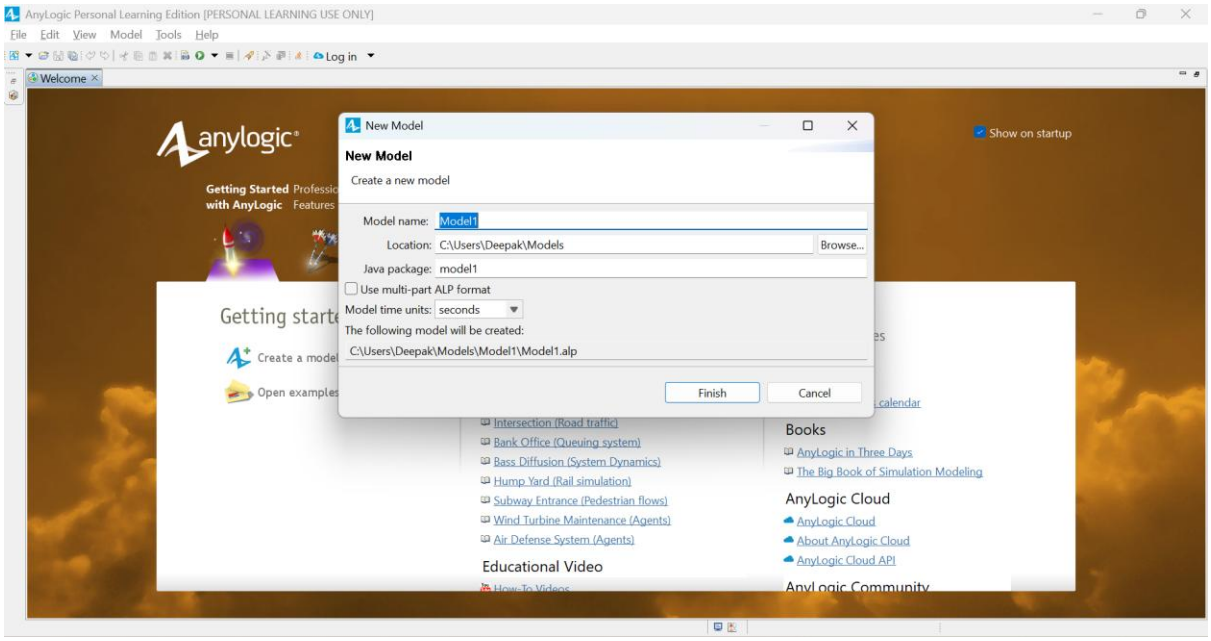
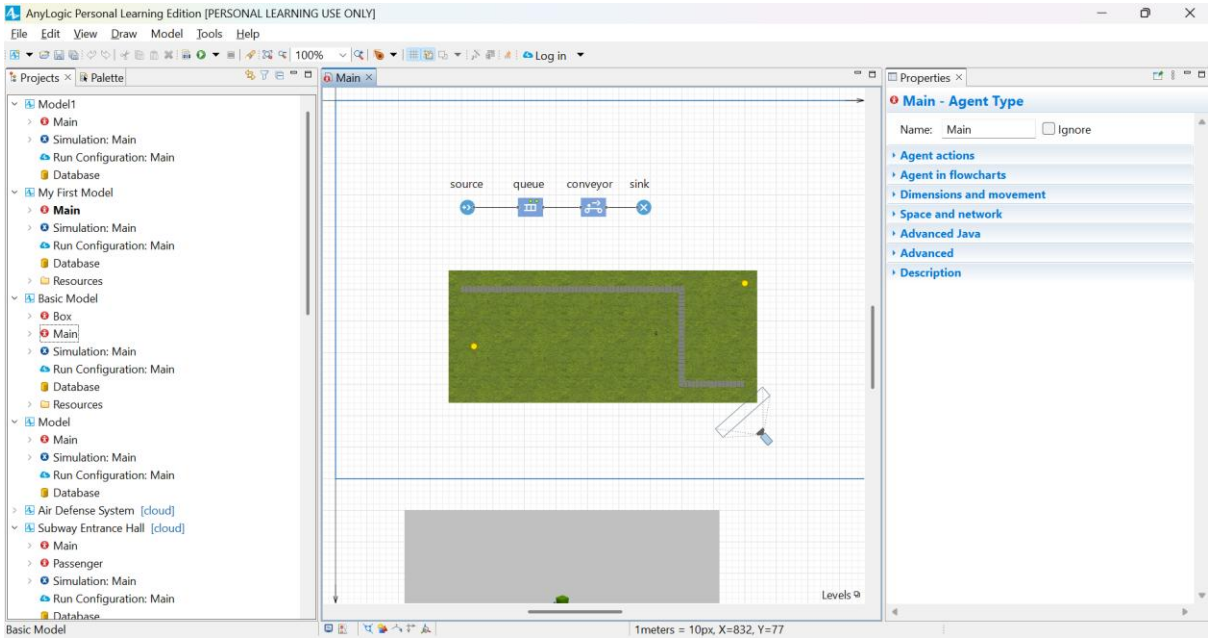
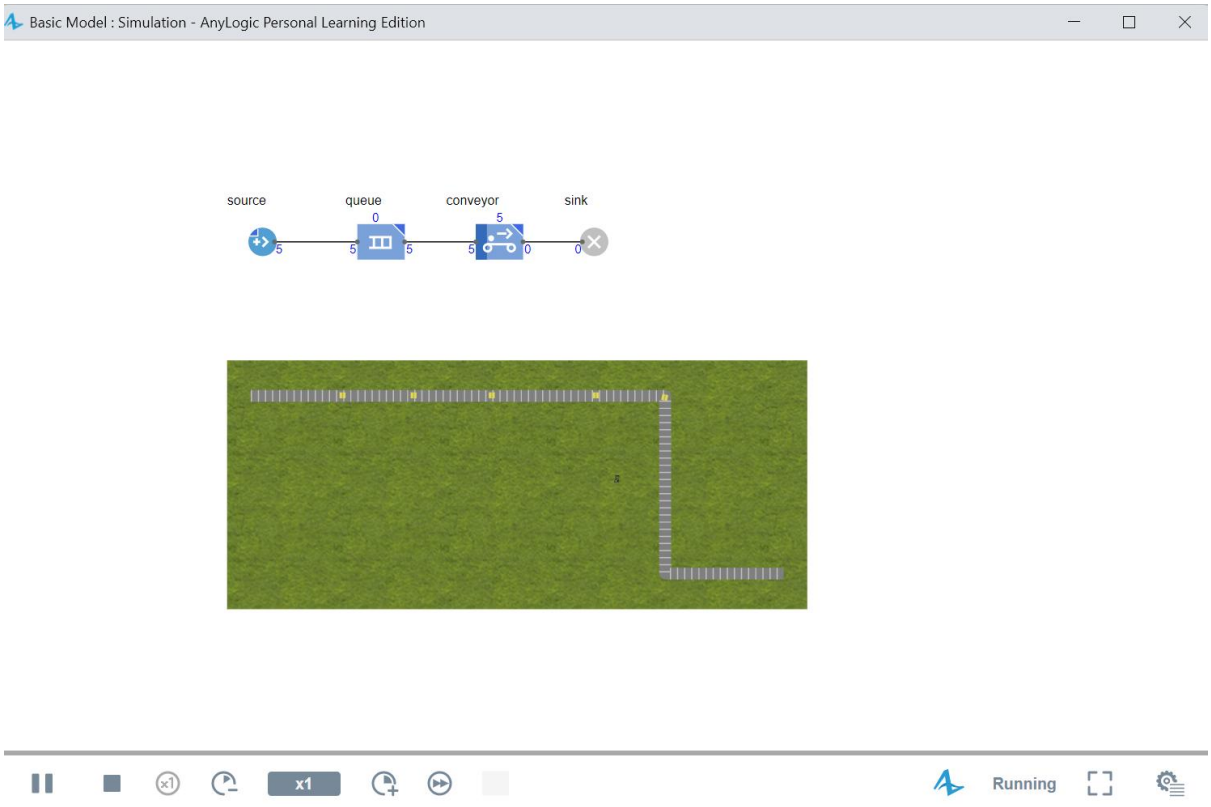


Creating a New Model



2. **Add 3D Animation View**: Navigate to the **Presentation** tab and drag a **3D Window** onto the canvas.



3. **Add a Conveyor System**:
    - In the **Material Handling Library**, drag a **Conveyor** onto the **3D animation** window.
    - Set the **length, speed, and texture** (grass texture for the ground).

4. **Add Boxes Moving on the Conveyor**:
    - Drag a **Source** block and connect it to the conveyor to generate boxes at intervals.

- Adjust the **arrival rate** to control box frequency.

5. **Add a Worker Beside the Conveyor**:
   - Use the **Agent Animation Library** to place a 3D **human worker** near the conveyor.
   - Define worker interaction with boxes (e.g., quality check or removal of faulty products).
6. **Adjust Camera Position and 3D Views**:
   - Go to **3D Window Properties** and set **default camera positions**.
   - Use the **Rotate, Pan, and Zoom tools** to adjust the viewing angle.
   - Enable **dynamic camera movement** for a realistic tracking view of the conveyor and worker.
7. **Run the Simulation** and visualize the movement of boxes on the conveyor with a worker standing beside it.

2. Simple AnyLogic Code for Conveyor Simulation

```
// Create a box entity
Box box = new Box();
box.setPosition(conveyor.getStartPosition());

// Move the box along the conveyor
conveyor.move(box, conveyor.getLength());

// Worker action when the box reaches the end
if (box.getPosition() == conveyor.getEndPosition()) {
   worker.pickup(box);
   worker.inspect(box);
}
```

Mechanical Context:

- **Boxes Represent:** Manufactured components on an assembly line.
- **Worker Represents:** A quality control inspector.
- **Grass Texture Represents:** Factory floor aesthetics.

3. Customizing the 3D Environment

- **Add a Grass Texture**: Go to the **Environment Settings** and apply a **grass image** as the ground texture.
- **Customize the Worker's Appearance**: Modify the **3D human model** to wear a factory uniform.
- **Adjust the Camera View**:
    - Set **fixed viewpoints** for top-down, side, and perspective views.
    - Use **smooth transitions** between different angles.
    - Implement **camera tracking** to follow moving objects dynamically.

4. Running and Exporting the Simulation

1. Click **Run** to start the animation.
2. Observe boxes moving along the conveyor and the worker interacting.
3. Adjust the **camera zoom and rotation** for better visualization.
4. To share the simulation:
    - Export as a **standalone application**.
    - Save as a **simulation video** for presentations.

Conclusion

AnyLogic provides a **realistic 3D simulation** of mechanical processes, making it a powerful tool for **conveyor systems, automated factories, and production lines**. This simple simulation of a conveyor with a worker can be further expanded to include **robotic arms, machine vision inspection, and AI-based automation.**

With proper **camera positioning and 3D view adjustments**, simulations become more immersive, helping engineers analyze factory processes more effectively.